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Nesting of the Chaffinch *Fringilla coelebs coelebs* Linnaeus, 1758

[Pp. 13—32, Pls. II—V, and 2 text-figs.]

Gnieżdżenie się zięby *Fringilla coelebs coelebs* Linnaeus, 1758

Гнездование зяблика *Fringilla coelebs coelebs* Linnaeus, 1758

Abstract. The nesting of the Chaffinch is dealt with. Species of trees in which its nests are built, nesting height and nest-site are discussed. The shape and size of nests, their stratified structure and materials of particular layers are also considered. Finally, the modes of nesting of different species belonging to the genus *Fringilla* are compared.

CONTENTS

I. INTRODUCTION

The Chaffinch *Fringilla coelebs coelebs* LINNAEUS, 1758 belongs to the commonest singing birds leaving Poland for winter. Chaffinches return in March, males usually several days earlier than females. Nest building begins in April,

all work being done exclusively by the female, which next lays on the average 4—6, most frequently 5 eggs. Much information about Chaffinches, their biology, behaviour, singing and migration is given in literature. It can be found both in general studies (TACZANOWSKI, 1882; BANNERMAN, 1953, 1963; BOME, 1954; MALCHEVSKY, 1959; HAARTMAN, 1969) and in studies concerning finches (NEWTON, 1972) or only Chaffinches (MARLER, 1956, SOKOŁOWSKI, 1969). However, there are no detailed studies on the nesting of this species.

The objective of the present work was to get to know the nesting of the Chaffinch. The description of the nest was based on an analysis of its site, size, shape and material. Through comparison with the nests of other members of the genus *Fringilla*, using chiefly material from literature, an attempt was made to find common distinctive characters of the nests within this genus. The work is one of the series of studies on the nesting of birds in Poland.

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II. MATERIAL AND METHODS

Materials for the present study were collected in different parts of Poland, mostly however in the south of the country. Data concerning nests come from Cracow and its neighbourhood (Ojców, Niepołomice Forest), the Carpathians (Pieniny, Babia Góra, Niskie Beskids) and the lowlands (Kampinos and Białowieża Forests, regions of Rzepin and Gdańsk). Materials obtained from the nest record cards of the Institute of Vertebrate Researches, Czechoslovakian Academy of Sciences, at Brno were also used.

In collecting the data, we paid attention to the species of trees in which the nests were found, the nesting height and the nest-site. Next the material of nests and their size and shape were examined. The nest size was determined by measuring its external and internal diameters, height and depth. In the cases of nests irregular in shape, the external and internal diameters were measured twice and their arithmetic means calculated from the measurements. If the nests were difficult of access, only the data about the site were recorded. Data have been collected for a total of 144 nests.

III. NEST-SITE

The Chaffinch mostly builds its nests in trees or shrubs. Out of the 134 nests, only four were situated in other places, namely, between bars of a fence (2 nests), among stones in a bridge abutment (1 nest) and in a wreath hanging on a ceme-

Table I

A list of species of trees and shrubs and the numbers of nests of Chaffinches found in them

Ser. No.	Species	No. of nests	%
1	*Picea excelsa*	21	15.9
2	*Pinus silvestris*	9	6.8
3	*Abies alba*	7	5.3
4	*Juniperus communis*	5	3.8
5	*Larix* sp.	4	3.0
6	*Thuja* sp.	4	3.0
7	*Taxus baccata*	1	0.8
8	*Chamaecyparis* sp.	1	0.8
	Total of coniferous trees and shrubs	52	39.4
9	*Alnus* sp.	11	8.3
10	*Quercus* sp.	8	6.1
11	*Betula* sp.	7	5.3
12	*Carpinus betulus*	7	5.3
13	*Tilia* sp.	5	3.8
14	*Sambucus nigra*	5	3.8
15	*Prunus* sp.	4	3.0
16	*Fagus silvatica*	4	3.0
17	*Aesculus hippocastanum*	3	2.3
18	*Fraxinus excelsior*	3	2.3
19	*Salix* sp.	3	2.3
20	*Robinia pseudoaccacia*	2	1.5
21	*Pirus* sp.	2	1.5
22	*Acer platanoides*	2	1.5
23	*Cerasus avium*	1	0.8
24	*Malus* sp.	1	0.8
25	*Acer pseudoplatanus*	1	0.8
26	*Ulmus* sp.	1	0.8
27	*Morus* sp.	1	0.8
28	*Padus avium*	1	0.8
29	*Populus* sp.	1	0.8
30	*Sorbus aucuparia*	1	0.8
31	*Prunus spinoza*	1	0.8
32	*Populus canadensis*	1	0.8
	Total of deciduous trees and shrubs	76	58.0
33	Between bars of a fence	2	1.5
34	In a bridge abutment	1	0.8
35	In a wreath on a cemetery cross	1	0.8
	Total of nests	132	100.5

tery cross (1 nest). The list of the species of trees and shrubs in which Chaffinches' nests were found, with numbers of nests falling to each, is given in Table I. It shows that the Chaffinch nests in many common species of trees and shrubs, most often in the spruce (16.4 % of nests) and next in the alder (8.8 %). Nevertheless, in general more nests were built in deciduous trees and shrubs than in coniferous ones. Nests are built both in old and young trees and in shrubs. All the trees whose trunk diameter at the height of the nest was smaller than the external diameter of the nest were regarded as young trees. The nest-sites are very various, but it is possible to distinguish several main types (Fig. 1). In old trees nests are often placed on a thick branch close to the trunk (Fig. 1, type A), in a trunk fork (type B) and among several thin offshoots (types D and E). Nests situated at a distance from the trunk are placed on a thick horizontal branch in the place

Table II

Sites of 134 nests of the Chaffinch (The types of nest-sites correspond with those in Fig. 1)

Time of building	Type of nest-site														
	A	B	C	D	E	F	G	H	I	J	K	L	Ł	M	N
Brood I	8	2	1	3	1	3	1	1	4	10	2	7	4	1	1
Brood II	—	1	1	1	—	3	4	3	4	12	2	5	1	1	—
Brood undetermined	2	7	6	1	3	1	1	5	2	7	—	4	5	—	3
Total	10	10	8	5	4	7	6	9	10	29	4	16	10	2	4

where several thin twigs grow out (type F) or another horizontal branch extends so that the nest leans against it (type G), or in a fork of a horizontal branch (types H and I). Nests placed in young trees and shrubs are built in forks of horizontal, slanting or vertical branches (types J, K and Ł), or based on several horizontal twigs near the trunk (types L and M). A comparison of the numbers of nests belonging to particular types of sites is given in Table II. It can be seen from it that the Chaffinch places its nest equally often in old trees (types A, B, C, D, E, F, G, H, I — 69 nests altogether) as in young trees and shrubs (types J, K, L, Ł, M — 61 nests altogether). Neither is there a major difference between the number of nests situated in old trees close to the trunk (types A, B, C, D and E) and that of nests at a distance from the trunk (types F, G, H and I), these numbers being, respectively, 37 and 32. There is a difference in numbers of nests built in different places in deciduous trees between successive broods. The nests of the first brood are more often situated close to the trunk (types A, B and D), whereas those of the second brood are rather built on side branches at a distance from the trunk (types F, G and H). Nests built in April and in the first half of May and those found in the second half of May but with large feathered nestlings in them were considered to be nests of the first brood, whereas nests with young ones whose state of development indicated the second half of May or later as the time of nest building were included among the nests of the second brood or the brood repeated after the destruction of the first one.

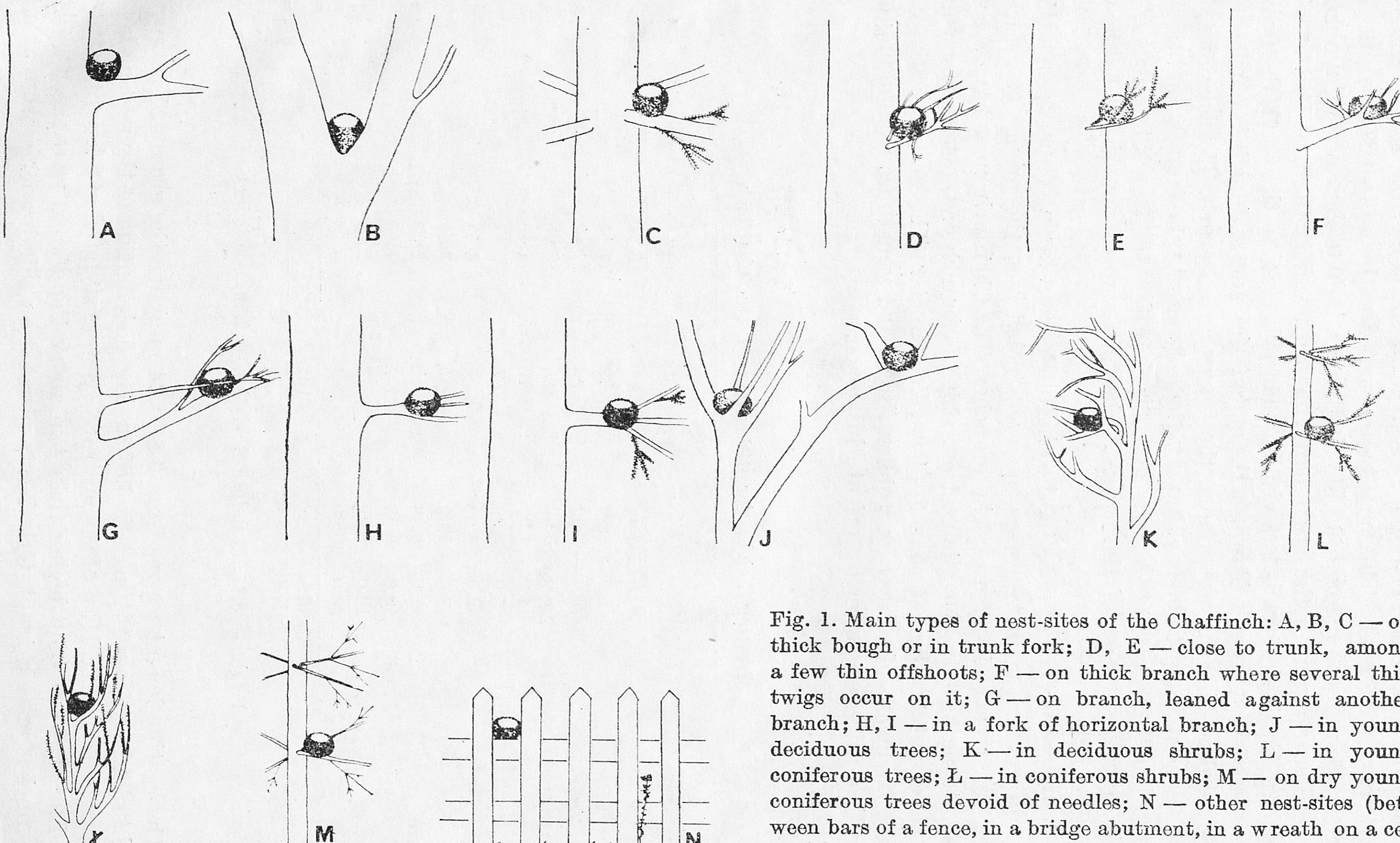


Fig. 1. Main types of nest-sites of the Chaffinch: A, B, C — on thick bough or in trunk fork; D, E — close to trunk, among a few thin offshoots; F — on thick branch where several thin twigs occur on it; G — on branch, leaned against another branch; H, I — in a fork of horizontal branch; J — in young deciduous trees; K — in deciduous shrubs; L — in young coniferous trees; Ł — in coniferous shrubs; M — on dry young coniferous trees devoid of needles; N — other nest-sites (between bars of a fence, in a bridge abutment, in a wreath on a cemetery cross)

No such differences could be observed as regards the nests situated in coniferous trees (types C, E and I). This may be connected with the fact that coniferous trees provide uniform possibilities for Chaffinches to hide their nests throughout the breeding season; on the other hand, in April and in the first half of May a nest in a deciduous tree is less visible when it is close to the trunk than when it lies on a leafless branch. Towards the end of May and in June it is much easier for the bird to hide its nest among the leaves on a branch. The possibility of hiding the nest seems to be one, but not the only one, of the factors conditioning its situation. That it is not the only factor is shown by the fact of finding a completely uncovered nest of the second brood on a dead young spruce devoid of needles (Phot. 7).

Whatever the type of the site, the Chaffinch's nest is always based on a thick bough or several small twigs, or squeezed in between the prongs of a forked trunk, but it never hangs from the branches. The Chaffinch must have a sufficiently strong base to place its nest on. If it is a branch or the stem of a young tree, it cannot be thinner than 3—4 cm in diameter. The nest is fastened to its base by means of cobweb or woollen shreds and sometimes by building into its wall a thin twig growing off at this place.

Table III

Nesting height for 131 nests of the Chaffinch

Height, in m.	Number of nests	%
0— 0.99	1	0.76
1.0— 1.99	29	22.14
2.0— 2.99	36	27.49
3.0— 3.99	25	19.08
4.0— 4.99	15	14.45
5.0— 5.99	5	3.81
6.0— 6.99	6	4.58
7.0— 7.99	5	3.81
8.0— 8.99	3	2.29
9.0— 9.99	2	1.53
10.0—19.99	3	2.29
20.0—30.00	1	0.76
Total	131	102.99

Mean nesting height — 3.87; Standard deviation — 2.36; coefficient of variation — 61.03

The nesting height ranges from 0.8 to 24 m above the ground. The average height obtained from 131 nests is 3.87 m. The distribution of the nesting heights is given in Table III. Most of the nests (83%) were situated at a height between 1 and 4.99 m. Nests built higher than 4 m above the ground were mostly placed on branches or in a trunk fork. Nests situated on side branches were at a dis-

tance of 0.8 to 5 m from the trunk. The average distance from the trunk calculated for 14 nests is 2.03 m. These nests were usually placed on the lowest branches of trees.

IV. SHAPE AND SIZE OF NEST

Seen from the outside, the newly built nest has the shape of a globe truncated somewhat above the equator. The rounded shape of the external surface, the strongly woven ring, and the soft lining, yielding to a touch, make the impression that the edge of the nest is turned in. In the sections through Chaffinches' nests this inward turn is either invisible or very indistinct. The walls and bottom of a nest taken off a tree are indented on the external side in compliance with the shape of the branches on which it was set. The nest abandoned by the young ones is deformed, often flattened (Phot. 7).

The nest size was determined on the basis of measurements taken on freshly built nests, before they had been deformed by the nestlings. The measurements of outer and inner diameters taken in different directions showed that some of the nests were oval. Differences between the two measurements of the outer diameter, ranging from 0.2 to 4.0 cm, were found in 33 nests. As regards the inner diameter, they were recorded for 20 nests and ranged from 0.1 to 3.0 cm. In most, that is 16, cases with a difference between the two inner diameters the outer diameters also differed, which shows that the elongate shape of the opening usually causes a change in the shape of the nest. The nest in which the outer diameter was 8×12 cm and the inner diameter 4.5×7 cm may be regarded as an example. This dependence is not reversible, i.e. the shape and size of the nest opening are not influenced by the outer diameters, for 51.5% of the nests

Table IV

Measurements of nests of the Chaffinch

Measurement	No. of nests	Range, in cm	Arithmetic mean	Standard deviation	Coefficient of variation
Inner diameter	74	4.2— 6.8	5.3	0.61	11.51
Outer diameter	75	7.6—11.3	9.0	0.89	9.85
Height	76	4.0—10.5	7.1	1.56	21.97
Depth	72	2.8— 6.0	3.99	0.64	16.00

with different outer diameters have the two inner diameters equal. The nest with its outer diameters of 9.7×7.0 cm and the inner diameter of 5.5×5.5 cm may be mentioned here as an example. The outer and inner diameters, height and depth of the nests examined, their arithmetic means, standard deviations and coefficient of variation are given in Table IV. The table shows that the outer

diameter is the least variable measurement (coefficient of variation — 9.85), whereas the nest height undergoes the greatest fluctuations (coefficient of variation — 21.97).

V. MATERIAL AND STRUCTURE OF NEST

An analysis of material used for building nests was carried out in two ways. Nests in which there were eggs or nestlings were described on the basis of their outer appearance, whereas those in which the brood had been destroyed or abandoned and those already left by the young were collected and next closely analysed. Attention was given to the occurrence of layers, their thickness, material of particular layers and the mode of arrangement of material. If the external

Table V

Analysis of material used to build nests of the Chaffinch *Fringilla coelebs coelebs*

Material	Data on the basis of inspection of whole nests		Data concerning nests dismantled for analysis		Total	
	No. of nests	%	No. of nests	%	No. of nests	%
moss	54	94.7	27	100.0	81	96.4
animals' hair	48	84.2	23	85.2	71	84.5
feather	40	70.2	22	81.5	62	73.8
grass, stalks	34	59.6	25	92.6	59	70.2
lichens	31	54.4	12	44.4	43	51.2
vegetable fibres	6	10.5	24	88.9	30	35.7
cobweb	10	17.5	20	74.1	30	35.7
cotton wool	14	24.6	14	51.8	28	33.3
rootlet	12	21.1	9	33.3	21	25.0
birch bark	7	12.3	11	40.7	18	21.3
bud scales	2	3.5	12	44.4	14	16.7
needles	4	7.0	9	33.3	13	15.5
twigs	7	.3	7	25.9	14	16.7
threads	5	7.8	3	11.1	8	9.5
wood-wool	4	7.0	4	14.8	8	9.5
dead leaves	2	3.5	6	22.2	8	9.5
pine bark	1	1.7	5	18.5	6	7.1
nylon thread, plastic foil	—	—	3	11.1	3	3.6
cocoon	—	—	3	11.1	3	3.6
paper	4	7.0	—	—	4	4.8
wool	—	—	2	7.4	2	2.4
straw	1	1.7	—	—	1	1.2
Number of nests	57		27		84	

layer was not uniformly thick, the arithmetic mean from the longest and the shortest measurement of the nest thickness was used in further calculations.

The Chaffinch's nest, although sometimes entirely uncovered, is hard to notice. It is set on a branch and usually very well masked. Since the Chaffinch sticks different materials on the external surface of the nest, it is often difficult

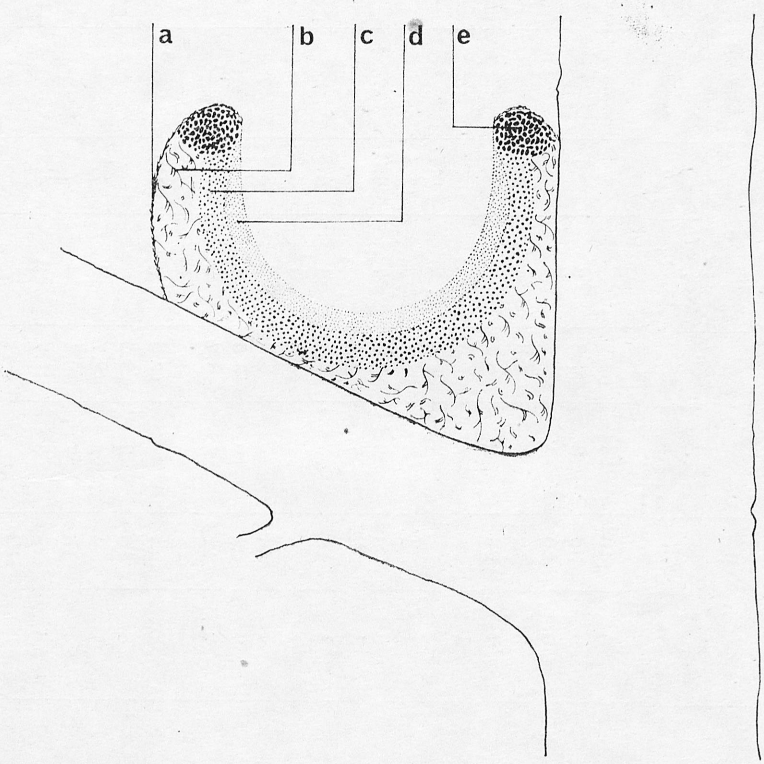


Fig. 2. Transverse section through the Chaffinch's nest: a — masking layer; b — external layer; c — middle layer; d — lining layer; e — ring

Table VI

Thickness of particular layers in the Chaffinch's nests examined

Layer	No. of nests	Range, in mm	Arithmetic mean	Standard deviation	Coefficient of variation
External (b)	19	0—46	17.0	9.43	55.47
Middle (c)	19	3—10	7.0	1.90	27.14
Lining (d)	16	2—12	5.4	2.21	40.08
Ring (e)	17	10—17	13.0	2.45	18.84

Table VII

Analysis of material used to make particular layers in 27 nests of the Chaffinch

In analysing the composition of particular layers, a three-grade scale has been assumed for the determination of the share of each component: +++ — very abundant or abundant (given component constitutes the bulk of the layer, ++ — in medium amounts, + — sporadically occurring component

Material	Layers as in Fig. 2.	a		b		c		d		e	
		No. of nests	%	No. of nests	%	No. of nests	%	No. of nests	%	No. of nests	%
moss	+++	10	40	15	65.2	—	—	—	—	5	23.9
(green parts)	++	9	36	8	34.8	6	27.1	1	4.8	10	47.6
	+	5	20	—	—	4	17.4	—	—	2	9.5
lichens	+++	3	12	1	4.3	1	4.3	—	—	—	—
	++	7	28	2	8.7	—	—	—	—	—	—
	+	1	4	1	4.3	—	—	—	—	—	—
dry grass	+++	—	—	—	—	2	8.7	—	—	—	—
	++	1	4	6	27.1	4	17.4	1	4.8	3	14.3
	+	2	8	3	13.0	1	4.3	—	—	1	4.8
rootlets	+++	—	—	1	4.3	—	—	—	—	—	—
	++	4	16	4	17,4	1	4.3	—	—	4	19.0
	+	1	4	1	4.3	1	4.3	—	—	—	—
stalke twigs	+++	1	4	1	4.3	2	8.7	—	—	7	33.3
	++	7	28	10	43.5	4	17.4	—	—	6	28.6
	+	3	12	2	8.7	3	13.0	—	—	1	4.8
lignified stalks	+++	—	—	—	—	—	—	—	—	2	9.5
	++	—	—	3	13.0	5	21.7	—	—	3	14.3
	+	4	16	3	13.0	—	—	—	—	3	14.3
vegetable	+++	1	4	2	8.7	6	27.1	1	4.8	1	4.8
fibres	++	4	16	7	30.4	4	17.4	—	—	7	33.3
	+	6	24	5	21.7	1	4.3	3	14.3	2	9.5
birch bark	+++	3	12	—	—	—	—	—	—	—	—
	++	5	20	5	21.7	2	8.7	—	—	—	—
	+	1	4	—	—	2	8.7	—	—	—	—
pine bark	+++	—	—	—	—	—	—	—	—	—	—
	++	3	12	1	4.3	1	4.3	—	—	—	—
	+	2	8	—	—	—	—	—	—	—	—
bud scales	+++	—	—	—	—	—	—	—	—	—	—

	++	2	8	1	4.3	—	—	—	—	—	—
	+	8	32	2	8.7	—	—	—	—	—	—
dead leaves	+++	—	—	—	—	—	—	—	—	—	—
	++	1	4	—	—	—	—	—	—	—	—
	+	2	8	—	—	2	8,7	—	—	—	—
vegetable down	+++	4	16	—	—	1	4,3	2	9,5	—	—
	++	7	28	8	34.8	5	21,7	—	—	4	19,0
	+	3	12	3	13.0	—	—	—	—	1	4,8
needles	+++	—	—	—	—	—	—	—	—	1	4.8
	++	2	8	2	8.7	—	—	—	—	1	4.8
	+	2	8	2	8.7	1	4.3	1	4.8	—	—
horse hair	+++	—	—	—	—	—	—	7	33.3	1	4.8
	++	—	—	—	—	2	8.7	5	23.9	4	19.0
	+	4	16	—	—	1	4.3	2	9.5	1	4.8
animals' hair	+++	—	—	—	—	5	21.7	13	61.9	—	—
	++	3	12	4	17.4	8	34.8	5	23.9	4	19.0
	+	4	16	4	17.4	1	4.3	—	—	5	23.9
feather	+++	—	—	—	—	3	13.0	2	9.5	—	—
	++	—	—	1	4.3	8	34.8	4	19.0	4	19.0
	+	1	4	2	8.7	6	26.1	10	47.6	4	19.0
threads, wool	+++	—	—	—	—	—	—	—	—	—	—
	++	—	—	—	—	—	—	—	—	—	—
	+	1	4	1	4.3	2	8.7	2	9.5	—	—
wood-wool	+++	—	—	—	—	—	—	—	—	—	—
	++	3	12	1	4.3	3	13.0	—	—	1	4.8
	+	1	4	2	8.7	1	4.3	—	—	—	—
cobweb	+++	4	16	1	4.3	—	—	—	—	1	4.8
	++	12	48	2	8.7	—	—	—	—	3	14.3
	+	2	8	—	—	—	—	—	—	—	—
moss sporophytes	+++	—	—	—	—	1	4.3	—	—	—	—
	++	—	—	—	—	1	4.3	2	9.5	—	—
	+	—	—	—	—	2	8.7	1	4.8	—	—
plastic foil	+++	—	—	—	—	—	—	—	—	—	—
	++	1	4	1	4.3	—	—	—	—	—	—
	+	1	4	—	—	—	—	1	4.8	—	—
cocoons	+++	—	—	—	—	—	—	—	—	—	—
	++	2	8	—	—	—	—	—	—	—	—
	+	1	4	—	—	—	—	—	—	—	—

to distinguish materials of which the nest wall is built. For this reason, an analysis of dismantled nests is necessary to obtain a full list of these materials. The results of such analyses are given in Table V.

The transverse section of a nest allows the discrimination of layers, several in number, which are represented diagrammatically in Fig. 2. The layers differ from each other both in their composition and in the arrangement of material. The boundary between the layers (e.g. between the external and middle layers) is either very distinct or the layers pass one into another gradually, which sometimes occurs between the middle layer and the lining and chiefly at the passage of the external and middle layers into the above-mentioned separate ring. The thickness of particular layers, standard deviations and coefficient of variation are presented in Table VI. It can be seen from this table that the thickness of the ring undergoes the smallest fluctuations and the thickness of the external layer is the most variable. It even varies from place to place in the same nest. For instance, the thickness of the external layer in one of the nests analysed ranged from 2 to 32 mm. A nest placed on a thick bough or squeezed into a trunk fork has its external layer reduced to 2—3 mm in the place where it touches the tree, or even this layer is missing completely. On the other hand, in the nests built on thin twigs the external layer may be as thick as 46 mm in some places. The results of the analysis carried out on the composition of particular layers of the nest are given in Table VII. The composition of the masking and external layers is most differentiated. The Chaffinch masks its nest with vegetable, animal and synthetic materials, of which the commonest are mosses, lichens, cotton wool, bud scales, birch bark and vegetable fibres. These materials are cemented evenly together with cobweb or bound with animals' hair. The external layer is chiefly constructed of moss, which constitutes the main component of this layer in 65% of nests examined. In the remaining 35% of the nests grass, stalks and vegetable fibres occur in an amount more or less equal to that of moss. This layer is loosely arranged, interlaced with animals' hair, sometimes stuck together by means of cobweb. Grass and fibres are arranged circularly (horizontally), whereas other components, like needles, pieces of bark, twigs of rootlets are placed in various directions. The middle layer is sharply separated from the external layer. It forms the nest cup. Moss, if present at all, occurs in small amounts. The middle layer is chiefly built of fibrous elements, i. e. grass, fine stalks and vegetable fibres, hair and feathers being often present in it. Materials are arranged circularly and form a compact mass. At the top of the nest the external and middle layers pass into the similarly compact ring, made of moss, grass, stalks — often lignified — and feathers, with rather soft shafts. In the ring the material is arranged circularly, interlaced with hair, sometimes stuck together with cobweb, and thus it forms a part of the nest which is most resistant to the deforming forces. The inside of the cup is loosely and, as if incidentally, lined with hair with an addition of soft feathers and, sometimes, vegetable fibres. They form the soft lining layer of the nest.

VI. DISCUSSION

The Chaffinch lives in a park-and-forest environment. It is common in gardens, parks and forests, where it mostly nests in trees and shrubs. The Chaffinch's choice of tree species for nesting in, as illustrated by 32 species of trees and shrubs mentioned in Table I, points at its great adaptability. The list can be increased by adding other species mentioned by different authors, namely, the jasmine (Dobbey, 1949), hazel and hawthorn (Czarnecki, 1956), aspen, red-berried elder, lilac, guelder-rose, Virginia creeper (Haartman, 1969), box alder, wistaria, weigelia (Michocki, 1974), and oleaster (Michocki, 1956). In parklands it more often nests in deciduous trees (Malchevsky, 1956). In Poland, which lies in the temperate zone, the Chaffinch nests in all common species of trees and shrubs rather in deciduous trees than in conifers, this predominance being however slight, as can be seen from the materials presented in this paper and from the data given by Czarnecki (1965 a and b), Foksowicz and Sokołowski (1956), Kulczycki (1966), Michocki (1967, 1974) and Mroczkiewicz (1974). In literature there are no detailed data concerning the situation of nests in trees. The present investigation shows that, as regards the choice of nest-site, the Chaffinch has no preferences and nests wherever it finds a sufficiently strong support for its nest. It nests as often in young trees and shrubs as in old trees. Neither does the number of nests built close to the trunk differ from that of nests situated at a distance from it. The great adaptability of the Chaffinch, as regards the nest-site, is indicated by the nests found in atypical places, i.e. in a bridge abutment, between bars of a fence, and in a wreath hanging on a cemetery cross. Other, though not numerous, cases of atypical nest-sites are mentioned in literature, e.g. in the stone strengthening of a stream bank (Fric, 1958), on a stone (Nagy, 1950), on the ground (Makatsch, 1957), in a shed (Barret, 1969; Makatsch, 1957; Michocki, 1974), on a projecting beam under eaves, on a rafter of a bridge, between stones of a wall, on a pillar, in a wood stack, on the swing in a garden, on a gutter pipe, and on a car (Haartman, 1969). The range of heights at which Chaffinches build their nests is fairly wide. According to Malchevski (1959), the Chaffinch's nest can be found from 1.5 to 12 m and according to Halladin (1935) and Kulczycki (1966), from several dozen centimetres to 12 m above the ground. Beme (1954) gives a wider range, from 1 to 15 m, and Haartman (1969) from 0.5 to 18 m. Similar ranges of nesting heights are given by Sokołowski (1969), who writes about "15 m or even higher", and by Derim (1958) — from 15 cm to 20 m. In the light of the present study the Chaffinch may nest even higher, up to 24 m. In spite of this, most nests are built at rather small heights. The average height ranges between 2 and 5 m, and this height may be regarded as typical of this species. It is given as typical also by other authors (Beme, 1954; Czarnecki, 1956 a and b; Derim, 1958; Marler, 1956; Malchewsky, 1959; Mazing, 1960; Kulczycki, 1966; Izga-

LIYEV, 1974). The measurements of the nest, as has been shown above, range within fairly wide limits. The data given in this respect by TACZANOWSKI (1882), HALLADIN (1935), BEME (1954), SOKOŁOWSKI (1969), GOTZMAN and JABŁOŃSKI (1972) and IZGALIYEV (1974) do not agree with each other. Nevertheless, all of them lie within the limits given above. Only the outer diameter given by GOTZMAN and JABŁOŃSKI (1972) and the nest height quoted by IZGALIYEV (1974) are somewhat above the upper limit and the outer diameter given by IZGALIYEV (1974) is slightly below the lower limit of the corresponding measur-

Table VIII

The ranges of nest measurements and their means in the Brambling *Fringilla montifringilla*, obtained from the nests in the British Museum and in Prof. KUZYAKIN's private collection (Moscow) and from literature (KUMARI, 1963; ANIKIN, 1963; LVOV, 1958)

Measurement	No. of nests	Range, in cm	Arithmetic mean
Inner diameter	5	5.6— 6.5	6.1
Outer diameter	5	10.0—13.0	11.5
Height	4	6.0— 8.0	7.0
Depth	5	3.5— 5.0	4.2

ements obtained in the present study. The outer diameter is the least variable dimension, whereas in other passerines that build open nests, e.g. the *Corvidae* (KULCZYCKI, 1973), the genus *Turdus* (BOCHEŃSKI, 1968) and *Passer domesticus* (KULCZYCKI and MAZUR-GIERASIŃSKA, 1968), the most constant dimension is the inner diameter. This may be connected with the very careful finishing of the external surface in the Chaffinch's nest, which fact is not met with in the above-mentioned birds, and with the different kind of material used. The very painstaking finishing and masking of the nest and the firm interlocking of material are characteristic of the Chaffinch. These characters have also been emphasized by TACZANOWSKI (1862), BANNERMAN (1953), BEME (1954), MARLER (1956) and SOKOŁOWSKI (1969). The material used by the Chaffinch to build its nest is very various. The nests situated in a forest are mostly built of moss, grass and stalks, masked with lichens and birch bark and lined with animals' hair and feathers. In the nests built in the vicinity of houses or in town parks moss is replaced with grass, stalks and even with paper and wood-wool. For masking the nest the Chaffinch uses materials that can easily be found in its neighbourhood, in parks and gardens, e.g. paper, pieces of plastic foil and wood-wool. The lining of the nest is also made up of material that is easy of attainment, like horse hair, feathers and cotton or nylon threads. SOKOŁOWSKI (1969) also drew attention to the fact that the Chaffinch uses nest materials which can be found in the proximity and BANNERMAN (1953) describes, among others, a nest built exclusively of stems and grass and lined with vegetable down and horse hair. Four layers and a ring can be distinguished in the transverse section through

the Chaffinch's nest. They differ in thickness, composition and arrangement of material. These observations agree with the data given by HALLADIN (1935), DOBBEN (1949), MARLER (1956) and NEWTON (1972).

In addition to the Chaffinch, the genus *Fringilla* includes also *Fringilla teydea*, an inhabitant of the Canary Is., and *Fringilla montifringilla*, which occurs in the forests of northern Europe. There is scanty information about the building of nests by these species, which is particularly true of *Fringilla teydea*, and thus their modes of nesting can be compared only to a small extent. It may be stated on the basis of the observations made by VOLSØE (1951), DRESSER (1910) and BANNERMAN (1963) on *Fringilla teydea*, the examination of the nests of *Fringilla montifringilla* in the collection of the British Museum at Tring and in Prof. KUZYAKIN's private collection in Moscow, and the data on the nesting of this last species given by DRESSER (1910), JOHANSEN (1944), BEME (1954), LVOV (1958), KISHCHINSKY (1960), MALYSHEVSKY (1962), ANIKIN (1963), BANNERMAN (1963), KUMARI (1963), SØMME (1965), van ORDEN (1967) and HAARTMAN (1969) that, as regards nesting, the species belonging to the genus *Fringilla* have some characters in common. Among these characters we may number their great plasticity in the choice of nest-site, expressed by a large number of tree species in which they build their nests, the way in which the nests are placed in a tree and the nesting height. In spite of this plasticity the main types of nest-sites and the average nesting heights are similar. The nests of the species under discussion have a similar globular shape, they are made of various materials, carefully finished and masked. Small differences are probably caused by their different distribution. Out of necessity *Fringilla teydea*, in the Canary Is., and *Fringilla montifringilla*, far in the north, build their nests in different species of trees. Available building material for nests also differs with climatic zones. A perceptible difference between the Chaffinch's nest and that of the Brambling is the more massive structure of the latter (DRESSER, 1910; JOHANSEN, 1944; BEME, 1954; LVOV, 1958; KISHCHINSKY, 1960; HAARTMAN, 1969). A comparison of the measurements of the nests of these two species confirms the existence of this difference. The measurements of five nests of Bramblings given in Table VIII differ from the corresponding measurements of Chaffinches' nests. The small number of the Brambling's nests measured does not permit a close analysis of variation in particular dimensions. It can only be stated that the outer diameter of the Brambling's nest is considerably longer than that in the Chaffinch's nest, whereas the nests of these species stand very close to each other as regards their height.

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STRESZCZENIE

Przedstawiony w obecnej pracy opis gnieżdżenia się zięby dotyczy usytuowania, materiału, sposobu budowy oraz kształtu i wielkości gniazda. Materiał pochodzi z całej Polski, głównie jednak z południowych jej regionów. Wykorzystane zostały również dane z Czechosłowacji z kartoteki gniazd Zakładu Badań Kręgowców ČSAN w Brnie. Na drzewach liściastych znaleziono więcej gniazd niż na drzewach iglastych, pomimo że najliczniej reprezentowany był świerk (Tab. I). Wśród różnych typów umiejscowienia (Ryc. 1, Tab. II) najliczniejszą grupę stanowią gniazda położone na młodych drzewach liściastych. Nie ma jednak różnicy w ilości gniazd zakładanych na drzewach starych i młodych oraz krzewach. Analiza różnych typów umiejscowienia wskazuje, że jednym z czynników decydujących o wyborze miejsca na gniazdo jest możliwość jego ukrycia. Bez względu na typ umiejscowienia gniazdo jest zawsze oparte od spodu, przy czym najgrubsza gałąź podstawy ma przynajmniej 3—4 cm grubości. Jest ono przymocowane do gałęzi za pomocą nitek pajęczyny i strzępów wełny. Gniazda zakładane są na różnej wysokości, najczęściej 1—5 m (Tab. III), a średnia wysokość dla 131 gniazd wynosi 3,87 m. Wymiary badanych gniazd zestawione są w tabeli IV. Średnica zewnętrzna, której średnia wartość dla 75 gniazd wynosi 9,0 cm, przy rozpiętości 7,6—11,3 cm jest najbardziej stałym wymiarem. Jest to prawdopodobnie wynik starannego wykończenia zewnętrznej powierzchni gniazda. Najczęściej używane do budowy gniazda składniki to: mech, trawy, sierść i pióra. W tabeli V zestawione zostały materiały użyte do budowy 84 gniazd. Gniazdo zbudowane jest z 4 warstw i pierścienia (Ryc. 2). Poszczególne warstwy różnią się rodzajem materiału oraz sposobem jego ułożenia. Grubość warstw w gnieździe przedstawiono w tabeli VI, a w tabeli VII wyniki analizy materiału użytego do budowy każdej z nich.

Na podstawie uzyskanych obecnie danych oraz w oparciu o wyniki innych autorów porównano sposoby gnieżdżenia się zięby i pozostałych przedstawicieli rodzaju *Fringilla*, tj. *Fringilla montifringilla* oraz *Fringilla teydea*. Do cech wspólnych należą: duża plastyczność w wyborze miejsca, wyrażająca się liczbą gatunków drzew, jak i wysokością położenia gniazda nad ziemią. Również wspólny dla tych gatunków jest kulisty kształt, staranne wykończenie i zamaskowanie gniazda oraz używanie różnorodnego materiału do jego budowy.

РЕЗЮМЕ

Представленное в настоящей работе описание гнездования зяблика касается расположения, материала, способа строения, а также формы и величины гнезда. Материал происходит из всей Польши, однако, главным образом, из её южных районов. Мы использовали также данные из Чехословакии, из картотеки гнёзд отдела исследований позвоночных Чехословацкой академии наук в Брне. На лиственных деревьях найдено больше гнёзд, чем на хвойных деревьях, хотя наиболее многочисленной была ель (Табл. I). Среди различных типов расположения (Рис. I, Табл. II) наиболее многочисленную группу составляют гнёзда расположенные на молодых лиственных деревьях. Однако, нет разницы в количестве гнёзд закладываемых на старых и молодых деревьях, а также кустарниках. Анализ различных типов расположения указывает, что одним из решающих факторов о выборе места на гнездо является возможность его укрытия. Несмотря на тип расположения гнездо всегда опирается снизу, причём наиболее толстая ветка основания имеет по крайней мере 3—4 см толщины. К ветке оно крепится паутинными нитьями и клочьями шерсти. Гнёзда закладываются на различной высоте, наиболее часто 1—5 м (Табл. III), а средняя высота для 131 гнёзд составляла 3,87 м. Размеры изученых гнёзд представлено в таблице IV. Внешний диаметр, которого средняя величина для 75 гнёзд составляет 9,0 см, при размахе 7,6—11,3 см, является наиболее постоянной величиной. Вероятно это результат аккуратной обделки внешней поверхности гнезда. Наиболее часто применяемые составные части для постройки гнезда: мох, травы, шерсть и перья. В V таблице сопоставлено материалы употребляемые к построению 84 гнёзд. Гнездо построено из 4 слоёв и кольца (Рис. 2). Отдельные слои отличаются типом материала, а также способом его укладки. Толщину слоёв в гнезде представлено в таблице VI, а в таблице VII результаты анализа материала использованного к построению каждого слоя.

На основании полученных в настоящее время данных, а также на основании результатов других авторов сопоставлено способы гнездования зяблика и остальных представителей рода *Fringilla*, то есть *Fringilla montifringilla*, а также *Fringilla teydea*. К общим признакам принадлежат: большая пластичность в выборе места выраженная числом видов деревьев, как и высотой расположения гнезда над землёй. Общим для этих видов, является также шарообразная форма, аккуратная обделка и маскировка гнезда а также использование различного материала для его построения.

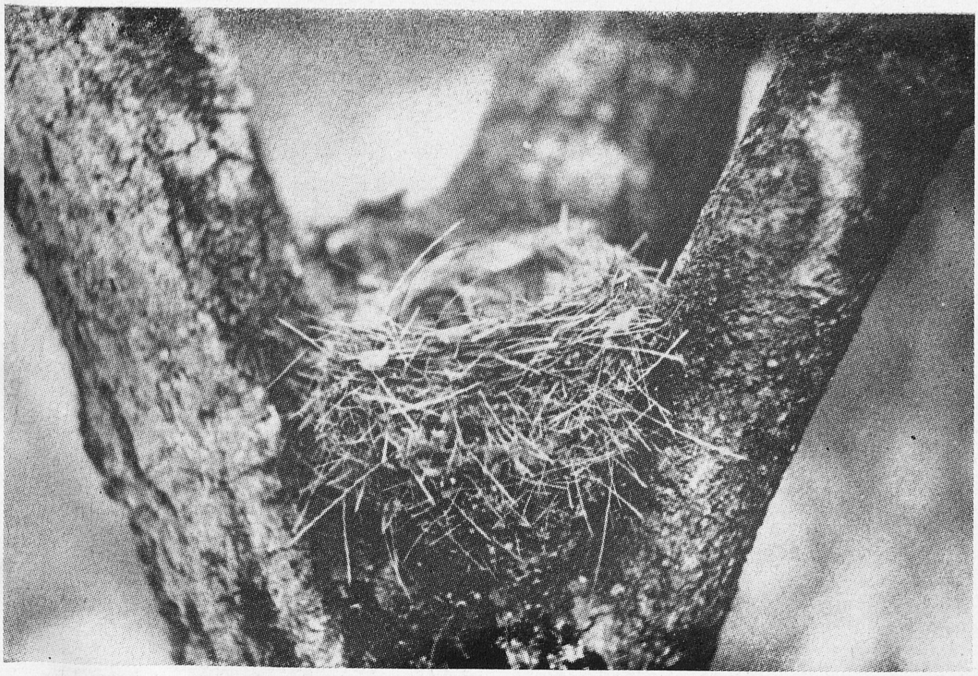
PLATES

Plate II

Phot. 1. A nest of the Chaffinch on a bough, close to the trunk of a pine (type A)
Phot. 2. A nest of the Chaffinch in a trunk fork (type B)



Phot. 1



Phot. 2

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Plate III

Phot. 3. A nest of the Chaffinch on a horizontal branch of an old oak, leaned against another horizontal branch (type G)

Phot. 4. A nest of the Chaffinch in forks of vertical branches of a young mountain ash (type J)



Phot. 3



Phot. 4

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Plate IV

Phot. 5. A nest of the Chaffinch placed in a deciduous shrub (type K)
Phot. 6. A nest of the Chaffinch hidden among the twigs of a young spruce (type L)



Phot. 5



Phot. 6

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Plate V

Phot. 7. A nest of the Chaffinch placed on a few horizontal twigs of a withered spruce (type M)



Phot. 7

T. Tomek, E. Waligóra

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